Supplementary information:

Clustering mechanism of ethanol-water mixture investigated with Photothermal microfluidic cantilever deflection spectroscopy

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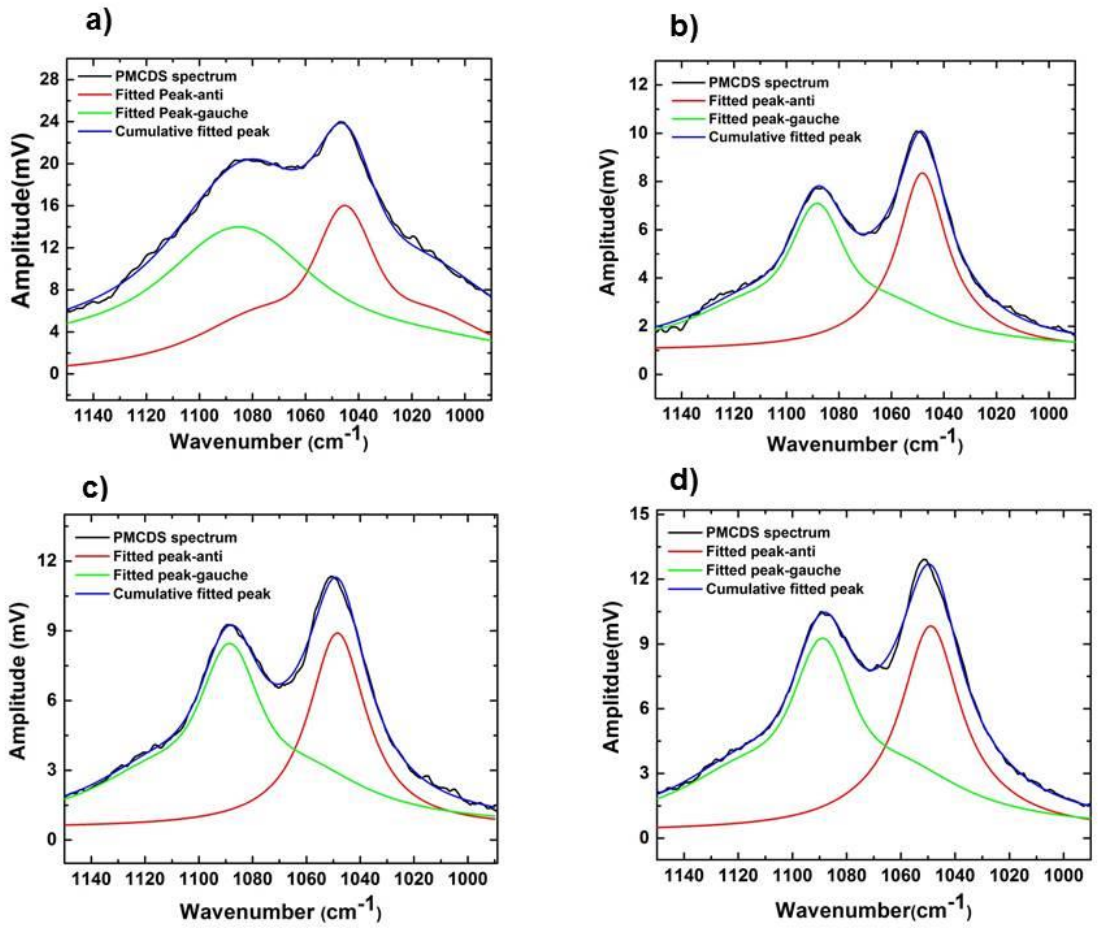
Section A) IR spectrum obtained using photothermal microfluidic cantilever deflection spectroscopy (PMCDS) when concentration of EtOH changes from 20 wt% to 100 wt% is deconvoluted using Voigt function. Each concentration was tested three times and here we show only first run of experiments. Following equation shows Voigt function used in this work.

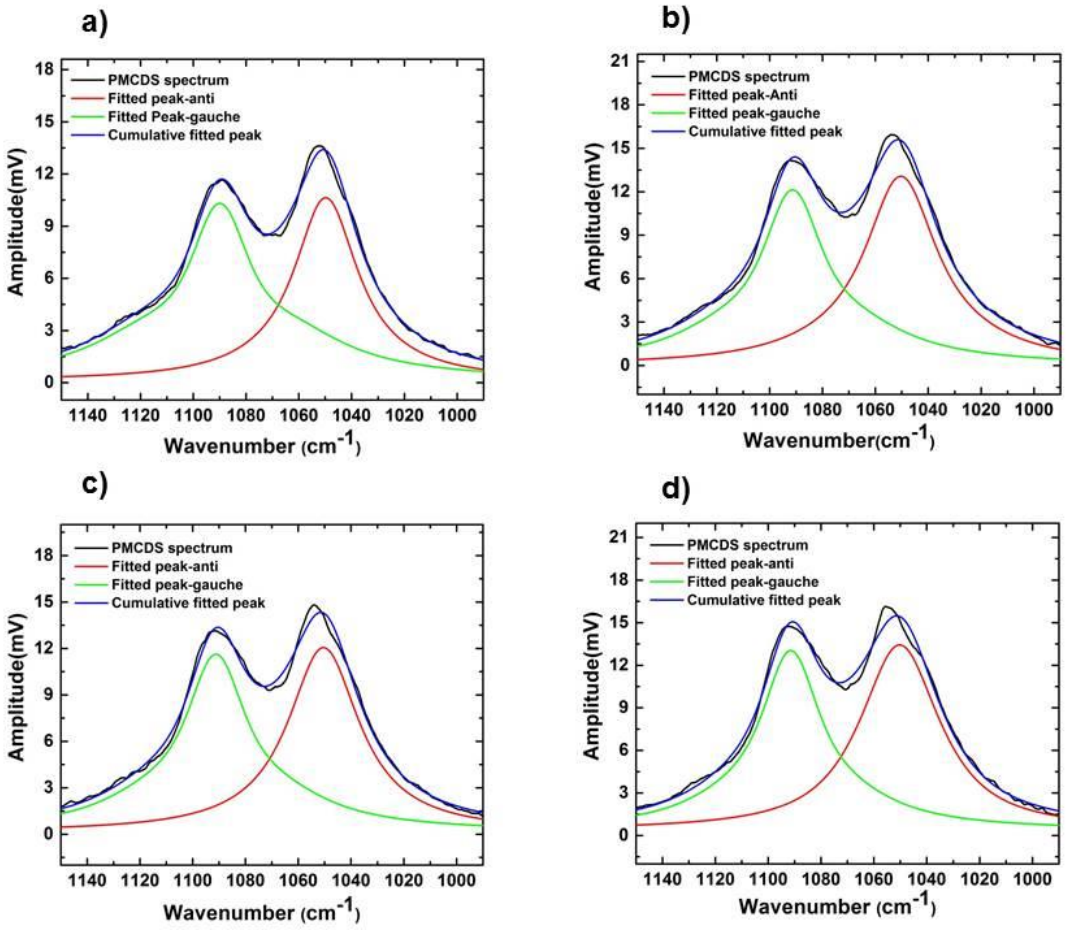
$$y = y_0 + A\left[\gamma\frac{2}{\pi}\frac{w}{4\left(x-x_c\right)^2+w^2} + \left(1-\gamma\right)\frac{\sqrt{4\ln 2}}{w\sqrt{\pi}}e^{\frac{-4\ln 2}{w^2}\left(x-x_c\right)^2}\right]$$

Where, y is profile intensity, y_0 is offset, x_c is center wavenumber, A is area, w is full width half maxima (FWHM) and γ is profile shape factor.

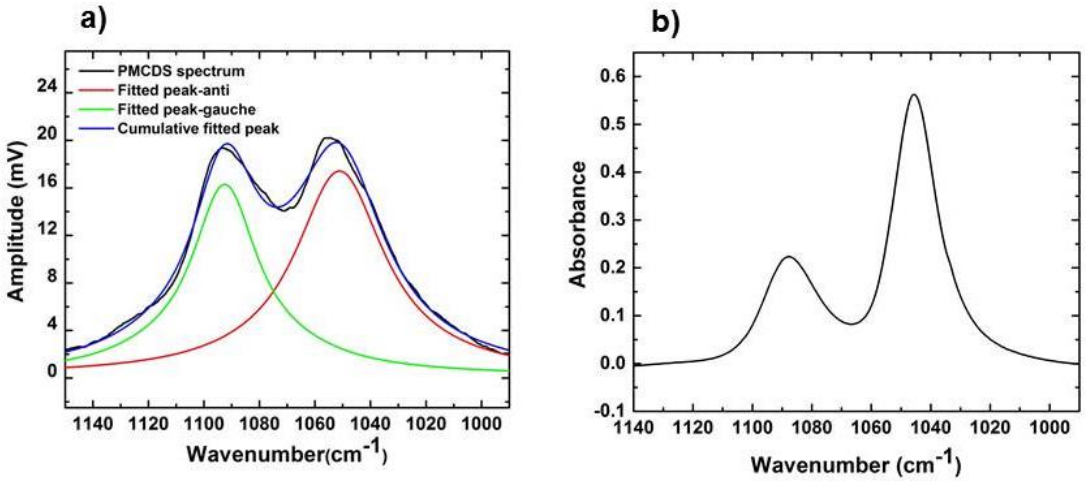
For comparison, spectrum of 100 wt% EtOH obtained using ATR-FTIR is shown in Figure S3.



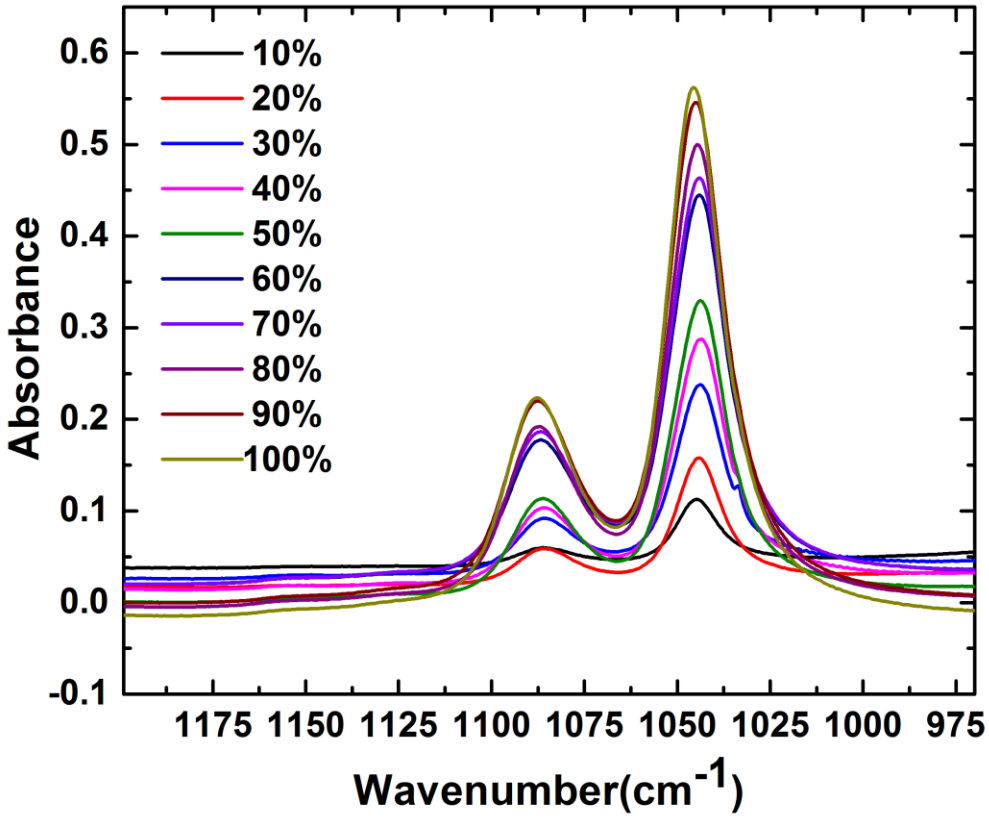
Supplementary Figure S1: IR spectrum obtained by PMCDS and deconvolutions of spectrum using Voigt function for the following concentrations of EtOH a) 20 wt% b) 30wt% c) 40wt% and d) 50wt%.



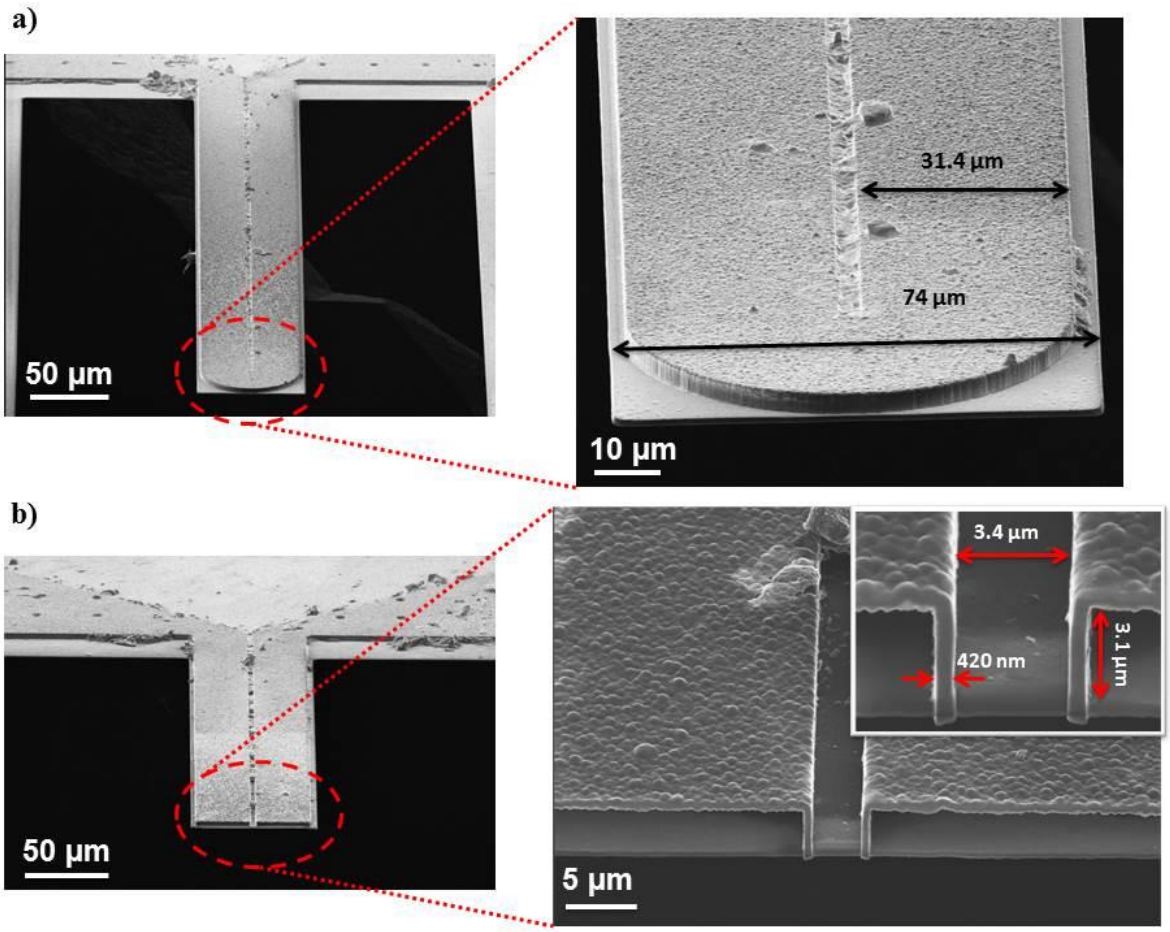
Supplementary Figure S2: IR spectrum obtain by PMCDS and deconvolutions of spectrum using Voigt function for the following concentrations of EtOH a) 60wt% b) 70wt% c) 80wt% and d) 90wt%.



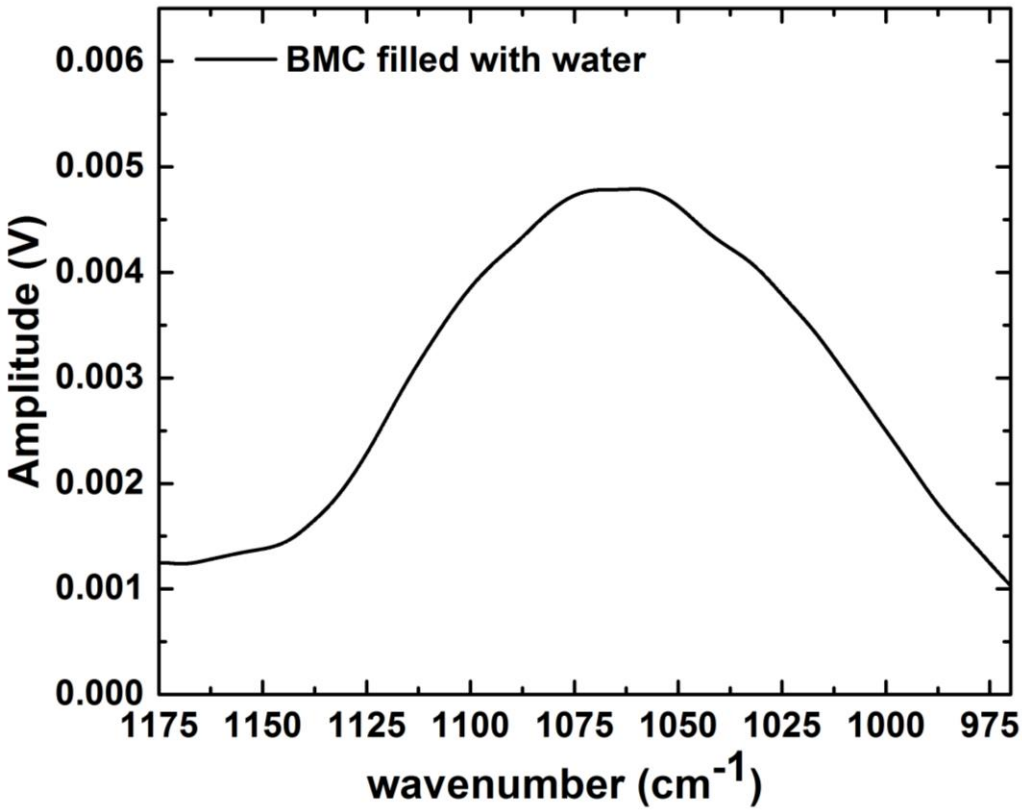
Supplementary Figure S3: IR spectrum obtained employing a) PMCDS and b) ATR-FTIR spectrum for 100 wt% EtOH



Supplementary Figure S4: ATR-FTIR spectrum of EtOH-water mixture as concentration of EtOH changes from 10 wt% to 100 wt%.



Supplementary Figure S5: Scanning Helium Ion Microscope (HiM) image of a microfluidic cantilever a) top view of the microfluidic cantilever and b) top view of a cut microfluidic cantilever and cross section of the channel constructed on the top of cantilever.



Supplementary Figure S6: PMCDS spectrum of bimaterial microfluidic cantilevers (BMC) filled with water used as subtraction reference